



ICF TECHNOLOGY INCORPORATED

MEMORANDUM



DATE: March 2, 1993

TO: Bob Benedetti

FROM: Gaynor Dawson *Gaynor Dawson*

SUBJECT: TOPICAL BRIEFING #9 - OU2 Groundwater Modeling and Baseline Risk Assessment Approach

Pursuant to your request, we have reviewed the work plan for OU2 (Technical Memorandum 5, 6 and 7) with respect to groundwater modeling and the subsequent baseline risk assessment. Based on that review, we believe there are five inherent risks associated with pursuit of the modeling as currently planned:

1. Potential for No Definitive Results. All parties agree that the hydrogeologic regime under study is a very complex one which will surely challenge the capabilities of existing groundwater codes. The decision has been made to run the model in a transient mode. Transient models are more difficult to calibrate and run than steady state models and there has already been a failure to achieve convergence on a steady-state simulation. Given these conditions, we must assume there is a chance that successful modeling may not be possible in the near term. At best, Woodward-Clyde has identified an optimistic schedule for flow model calibration that is not likely to be met.
2. Potential for Erroneous Results. The current approach to modeling has placed significant constraints on the system by virtue of boundary condition assumptions. We believe several of these are unrealistic and may drive the model to the wrong end point. Indeed, we believe failure to get convergence in a steady state mode and abandonment of the water balance calculations are the direct result of erroneous boundary conditions. Specifically, we believe there are inflows from the west and that there is significant leakage to the bedrock. If these boundary conditions are not changed to values that can be justified, model results are likely to be misleading.
3. Potential for Future Work to Invalidate the Model. It is standard modeling practice to begin at a large regional scale at boundaries where conditions are known (e.g., no flow or constant head conditions) before focusing in on a local model.

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Unfortunately, in this case, the regional model for Rocky Flats is not scheduled for completion until after the OU2 deliverables are complete. This raises the potential that after the fact, the regional model will substantiate that the wrong boundary conditions were used in the local model. This may necessitate remodeling the local aquifer.

4. Potential Loss of Credibility in How the Problem is Portrayed. Various parties have put forward the proposition that plutonium transport has been the result of migration of colloidal sized particles. However, the proposed code, and for that matter all available codes, are incapable of addressing colloidal transport. Therefore, there is a perceived disconnect in the proposed model approach which will damage credibility if left unaddressed.
5. Time and Cost. If no results or invalid results are obtained, the time and cost will be wasted. Furthermore, to the extent that transient modeling is more costly than steady state modeling, the additional costs appear unwarranted. All results will be input to a 35-year exposure risk assessment and the transient results will be averaged. The long time period makes a steady state analysis more meaningful and probably more conservative than a transient analysis. Therefore, it is hard to justify added costs for transient calculations

In order to minimize the impact of these risks, we believe EG&G should initiate a second, parallel approach as a contingency. This simplified approach would use water balance and mass flux calculations to develop a worst case, bounding estimate of exposure concentrations. (The proposed work plan is attached). We see several advantages to taking such an approach:

1. This provides an alternate approach in case the model cannot be used in the necessary time frame;
2. This provides a means of conducting a reality check for model results;
3. This may provide valuable input to improve model assumptions during the modeling effort; and
4. This responds to EPA guidelines to develop bounding calculations prior to the baseline risk assessment in order to identify insignificant pathways.

We have also looked at the broader aspects of the risk assessment that has been proposed. As a result of that review, we have identified the following additional concerns:

1. Supporting data will be needed to substantiate conclusions that some pathways are negligible or insignificant. The current treatment is insufficient. Bounding calculations such as those proposed for groundwater would be useful in this regard. For instance, existing site

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data on particulates in the atmosphere could be used to calculate maximum surface soil concentrations which could be encountered without exceeding levels of acceptable risk. If our suspicions are correct, this pathway will be found to be insignificant.

2. The Technical Memorandum raises questions about the efficacy of several exposure scenarios and yet leaves them in. This is a great way to become obligated to remedy non-problems at great cost. The primary example is the on-site resident ingesting groundwater. The low transmissivities encountered on site make it unrealistic that the alluvium will ever be used for potable supply. Monitoring wells in many areas will not make water, let alone provide a reliable supply. EG&G must make a conscious decision as to whether they want to set an irrevocable precedent by pursuing unrealistic scenarios.
3. Risks arise from total contaminant exposures. OU2 is not the only source of contaminants. How will inputs from other portions of the plant be addressed? Some thought must be given to this integration of risks from multiple sources across the plant. Similarly, how will chemical and radiological risks be combined or considered in tandem?

Based on this review and our current understanding of circumstances we recommend the following actions:

1. Authorize initiation of the contingency bounding calculations for groundwater immediately to reduce the risks inherent in the proposed model.
2. Recognize the optimistic nature of the modeling schedule and plan several points in time for a critical review of decisions related to the numerical modeling.
3. Direct staff to utilize more realistic boundary conditions on the flow model with respect to upgradient inflows and vertical leakage.
4. Request bounding calculations for non-groundwater pathways to allow early termination of modeling efforts where more conservative calculations indicate acceptable risks.
5. Make a firm policy decision with respect to pursuing an unrealistic groundwater ingestion scenario or challenging the regulators. The decision should be based on a reasoned analysis of the long term implications of setting a precedent.
6. Convene a task force to discuss how risks will be calculated with respect to combined effects of chemicals and radioisotopes and the combined effects of multiple OUs.

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I hope these thoughts are of use to you. As always, I will be happy to discuss any or all of them with you at your convenience.

GWD:ccm